

OPEN MEETING AGENDA ITEM

**ASU** W. P. Carey  
School of Business  
Arizona State University  
Seidman Research Institute



***The Potential Economic and Fiscal Impacts of  
Community Solar in Arizona***

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## L. WILLIAM SEIDMAN RESEARCH INSTITUTE

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- Turf Paradise
- Valley METRO Light Rail
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- Waste Management Inc.
- Wells Fargo
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## EXECUTIVE SUMMARY

The purpose of this study is to estimate the economic and fiscal impacts for the potential rollout of community solar installations in Arizona.

These are defined by The U.S. Department of Energy as “...any solar project or purchasing program, within a geographic area, in which the benefits of a solar project flow to multiple customers such as individuals, businesses, nonprofits, and other groups.”<sup>1</sup>

### Lifetime Economic and Fiscal Impact of Three Single Solar Projects

The study begins with statewide economic and fiscal impact estimates for the construction and 25-year operation of single 5MW, 10MW and 20MW solar projects in Arizona. Seidman’s analysis assumes that all projects are ground mount single axis tracking projects to both simplify the data set and align with the majority of community solar development across the country. However other project types of are also commonly allowed in other jurisdictions.

The economic and fiscal impacts are summarized in Table ES1:

**Table ES1: The Lifetime Economic and Fiscal Impacts of the Construction and Operation of a Single Solar Project**

SOLAR PROJECT SIZE	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)	GROSS OUTPUT (\$) <sup>2</sup>
5MW	\$12,244,101	128.3	\$8,895,138	\$24,380,767
10MW	\$22,564,907	240.8	\$16,197,440	\$42,281,512
20MW	\$41,664,759	451.8	\$29,516,959	\$74,773,582

*Source: Authors’ Calculations*

The construction of a single 5MW solar project is assumed to take 6 months. For a single 10MW solar project, the construction phase is assumed to take 7.5 months, and for a single 20MW solar project 9 months. Each solar project is also assumed to operate for 25 years.

Seidman estimates that the construction and 25-year operation of a 5MW solar installation will generate more than \$12.2 million State GDP in the State of Arizona. State GDP represents the dollar value of all goods and services produced for final demand in Arizona. The construction and 25-year operation of a 5MW solar installation will also generate 128.3 job years employment, and approximately \$8.9 million labor income. The employment estimate is

<sup>1</sup> Source: <https://www.energy.gov/eere/solar/community-solar-basics>

<sup>2</sup> Gross Output is principally a measure of an industry’s sales or receipts, which include sales to final users in the economy (State GDP), and sales to other industries (intermediate inputs).

a count of full- and part-time jobs, including wage/salary workers, and the self-employed. It is measured in job years and should not be confused with a job. A job year is a job that is held for 12 consecutive months. For example, a person working at a solar contractor for five consecutive years has one job but five job years employment. The labor income impact estimate includes all forms of employment income, including employee compensation (wages and benefits) and proprietor income.

Seidman estimates that the total lifetime economic and fiscal impacts of a 10MW solar project in the State of Arizona are approximately \$22.6 million State GDP, 240.8 job years employment, and approximately \$16.2 million labor income.

Seidman estimates that the total lifetime economic and fiscal impacts of a 20MW solar project in the State of Arizona are approximately \$41.7 million State GDP, 451.8 job years employment, and more than \$29.5 million labor income.

### **Lifetime Impact of Six Community Solar Rollout Scenarios in the APS Service Territory**

Arizona Public Service (APS) and Tucson Electric Power (TEP) are two public utilities in the State of Arizona. The study therefore concludes with lifetime economic and fiscal impact estimates for six separate community solar scenarios in each public utility's service territory. All impacts are statewide estimates. Unless otherwise stated, all dollar values are in current 2022 dollars.

The APS service territory scenarios examined are as follows:

- Rollout of up to 100MW of community solar projects per year over 7 years or 10 years.
- Rollout of up to 200MW of community solar projects per year over 7 years or 10 years.
- Rollout of up to 300MW of community solar projects per year over 7 years or 10 years.

The number of solar projects constructed annually in each scenario is based on the experience of CCSA members across multiple markets, with some adjustments made to reflect the expertise of solar contractors in Arizona and the nature of the state's distribution grid and interconnection queue.

The total impact estimates for each scenario are summarized in Table ES2. The lifetime economic and fiscal impacts for each scenario encompass the construction and 25 years operations for each installed solar project. This is reflected in the 32 or 35 year study time horizons referenced in Table ES2.

**Table ES2: The Lifetime Economic and Fiscal Impacts of 6 Community Solar Scenarios in the APS Service Territory**

SCENARIO	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)
#1 100MW over 7 years (32 year study time horizon)	\$1,228,090,227	13,067.5	\$882,517,775
#2 100MW over 10 years (35 year study time horizon)	\$1,840,831,943	19,576.7	\$1,326,995,415
#3 200MW over 7 years (32 year study time horizon)	\$2,436,624,707	25,945.3	\$1,750,076,819
#4 200MW over 10 years (35 year study time horizon)	\$3,662,108,138	38,963.7	\$2,639,032,099
#5 300MW over 7 years (32 year study time horizon)	\$3,676,959,036	39,141.1	\$2,641,489,732
#6 300MW over 10 years (35 year study time horizon)	\$5,515,184,182	58,668.7	\$3,974,922,653

*Source: Authors' Calculations*

Scenario #1 assumes that 67 solar projects are installed over 7 years (forty-six 5MW, eleven 10MW, and ten 20MW solar projects). The total lifetime economic and fiscal impacts of Scenario #1 in the State of Arizona are more than \$1.2 billion State GDP, 13,067.5 job years employment, and more than \$882.5 million labor income. They equate to average annual statewide contributions of \$38.4 million State GDP, 408.4 jobs, and \$27.6 million labor income.

Scenario #2 assumes that 103 solar projects are installed over 10 years (seventy 5MW, seventeen 10MW, and sixteen 20MW solar projects). The total lifetime economic and fiscal impacts of Scenario #2 in the State of Arizona are more than \$1.8 billion State GDP, 19,576.7 job years employment, and more than \$1.3 billion labor income. They equate to average annual statewide contributions of \$52.6 million State GDP, 559.3 jobs, and \$37.9 million labor income.

Scenario #3 assumes that 130 solar projects are installed over 7 years (eighty-seven 5MW, twenty-two 10MW, and twenty-one 20MW solar projects). The total lifetime economic and fiscal impacts of Scenario #3 in the State of Arizona are more than \$2.4 billion State GDP, 25,945.3 job years employment, and approximately \$1.8 billion labor income. They equate to average annual statewide contributions of \$76.1 million State GDP, 810.8 jobs, and \$54.7 million labor income.

Scenario #4 assumes that 202 solar projects are installed over 10 years (one hundred and thirty-five 5MW, thirty-four 10MW, and thirty-three 20MW solar projects). The total lifetime economic and fiscal impacts of Scenario #4 in the State of Arizona are approximately \$3.7 billion State GDP, 38,963.7 job years employment, and more than \$2.6 billion labor income. They equate to average annual statewide contributions of \$104.6 million State GDP, 1,113.2 jobs, and \$75.4 million labor income.

Scenario #5 assumes that 198 solar projects are installed over 7 years (one hundred and thirty-four 5MW, thirty-three 10MW, and thirty-one 20MW solar projects). The total lifetime economic and fiscal impacts of Scenario #5 in the State of Arizona are approximately \$3.7 billion State GDP, 39,141.1 job years employment, and more than \$2.6

billion labor income. They equate to average annual statewide contributions of \$114.9 million State GDP, 1,223.2 jobs, and \$82.5 million labor income.

Scenario #6 assumes that 306 solar projects are installed over 10 years (two hundred and six 5MW, fifty-one 10MW, and forty-nine 20MW solar projects). The total lifetime economic and fiscal impacts of Scenario #6 in the State of Arizona are more than \$5.5 billion State GDP, 58,668.7 job years employment, and approximately \$4.0 billion labor income. They equate to average annual statewide contributions of \$157.6 million State GDP, 1,676.2 jobs, and \$113.6 million labor income.

### Lifetime Impact of Six Community Solar Rollout Scenarios in the TEP Service Territory

The TEP service territory scenarios examined are as follows.

- Rollout of up to 30MW of community solar projects per year over 7 years or 10 years.
- Rollout of up to 60MW of community solar projects per year over 7 years or 10 years.
- Rollout of up to 90MW of community solar projects per year over 7 years or 10 years.

The number of solar projects constructed annually in each scenario is based on the experience of CCSA members across multiple markets, with some adjustments made to reflect the expertise of solar contractors in Arizona and the nature of the state's distribution grid and interconnection queue.

The total impact estimates for each scenario are summarized in Table ES3. The lifetime economic and fiscal impacts for each scenario encompass the construction and 25 years operations for each installed solar project. This is reflected in the 32 or 35 year study time horizons referenced in Table ES3.

**Table ES3: The Lifetime Economic and Fiscal Impacts of Community Solar Scenarios in the TEP Service Territory**

SCENARIO	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)
#7 30MW over 7 years (32 year study time horizon)	\$394,438,866	4,154.4	\$285,575,374
#8 30MW over 10 years (35 year study time horizon)	\$600,484,403	6,322.0	\$435,273,316
#9 60MW over 7 years (32 year study time horizon)	\$762,640,304	8,114.7	\$548,135,084
#10 60MW over 10 years (35 year study time horizon)	\$1,128,127,482	11,997.6	\$813,330,190
#11 90MW over 7 years (32 year study time horizon)	\$1,172,258,071	12,471.6	\$842,512,842
#12 90MW over 10 years (35 year study time horizon)	\$1,712,220,427	18,218.6	\$1,234,064,377

Source: Authors' Calculations

Scenario #7 assumes that 28 solar projects are installed over 7 years (twenty-three 5MW and five 10MW solar projects). CCSA did not consider 20MW installations in this scenario due to the small overall program size. The total

lifetime economic and fiscal impacts of Scenario #7 in the State of Arizona are more than \$394.4 million State GDP, 4,154.4 job years employment, and approximately \$285.6 million labor income. They equate to average annual statewide contributions of \$12.3 million State GDP, 129.8 jobs, and \$8.9 million labor income.

Scenario #8 assumes that 43 solar projects are installed over 10 years (thirty-five 5MW and eight 10MW solar projects). CCSA again did not consider 20MW installations in this scenario due to the small overall program size. The total lifetime economic and fiscal impacts of Scenario #8 in the State of Arizona are approximately \$600.5 million State GDP, 6,322.0 job years employment, and approximately \$435.3 million labor income. They equate to average annual statewide contributions of \$17.2 million State GDP, 180.6 jobs, and \$12.4 million labor income.

Scenario #9 assumes that 41 solar projects are installed over 7 years (twenty-five 5MW, eleven 10MW, and five 20MW solar projects). The total lifetime economic and fiscal impacts of Scenario #9 in the State of Arizona are more than \$762.6 million State GDP, 8,114.7 job years employment, and more than \$548.1 million labor income. They equate to average annual statewide contributions of \$23.8 million State GDP, 253.6 jobs, and \$17.1 million labor income.

Scenario #10 assumes that 62 solar projects are installed over 10 years (thirty-seven 5MW, seventeen 10MW, and eight 20MW solar projects). The total lifetime economic and fiscal impacts of Scenario #10 in the State of Arizona are more than \$1.1 billion State GDP, 11,997.6 job years employment, and more than \$813.3 million labor income. They equate to average annual statewide contributions of \$32.2 million State GDP, 342.8 jobs, and \$23.2 million labor income.

Scenario #11 assumes that 64 solar projects are installed over 7 years (forty-three 5MW, twelve 10MW, and nine 20MW solar projects). The total lifetime economic and fiscal impacts of Scenario #11 in the State of Arizona are approximately \$1.2 billion State GDP, 12,471.6 job years employment, and more than \$842.5 million labor income. They equate to average annual statewide contributions of \$36.6 million State GDP, 389.7 jobs, and \$26.3 million labor income.

Scenario #12 assumes that 94 solar projects are installed over 10 years (sixty-one 5MW, eighteen 10MW, and fifteen 20MW solar projects). The total lifetime economic and fiscal impacts of Scenario #12 in the State of Arizona are more than \$1.7 billion State GDP, 18,218.6 job years employment, and more than \$1.2 billion labor income. They equate to average annual statewide contributions of \$48.9 million State GDP, 520.5 jobs, and \$35.3 million labor income.

## 1. INTRODUCTION

The Coalition for Community Solar Access (CCSA) is a national coalition of businesses and nonprofits working to expand customer choice and access to solar for residential and commercial customers through community-based installations.

The U.S. Department of Energy defines community solar as “...any solar project or purchasing program, within a geographic area, in which the benefits of a solar project flow to multiple customers such as individuals, businesses, nonprofits, and other groups.”<sup>3</sup>

Community solar customers can either buy or lease a portion of the solar energy generated by an offsite project and receive an electric bill credit for their share of the electricity generated by their community solar system.<sup>4</sup> These solar projects predominantly have 2MW or 5MW generating capacity, but larger solar projects are also possible.

To date, 22 states nationwide have proposed, established a program, or have regulations pending for third party community solar.

In 2021, CCSA commissioned the University of New Mexico Bureau of Business & Economic Research (BBER) to estimate the potential economic impact of the construction and operation of 25MW, 50MW and 100MW community solar projects undertaken through 2MW or 5MW project linear-scaled implementations within their state. Using an IMPLAN model customized for the State of New Mexico, BBER estimated the direct, indirect, and induced employment, labor income, and output impacts of several community solar initiatives over five years in counties served by three key utilities.

The purpose of the current study is to estimate the economic and fiscal impacts for the potential rollout of community solar in Arizona. Beginning with an estimate of statewide economic impact for the construction and operation of single 5MW and 10MW and 20MW solar projects in Arizona, this study investigates the economic impact of several 7- and 10-year community solar rollout scenarios in the service territories of the two of the state’s public utilities – Arizona Public Service (APS) and Tucson Electric Power (TEP).

The APS service territory scenarios examined are as follows:

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<sup>3</sup> Source: <https://www.energy.gov/eere/solar/community-solar-basics>

<sup>4</sup> On-site multifamily community solar rooftop top models are also possible, enabling the occupants of apartment and condominium buildings to benefit from the energy produced.

- Rollout of up to 100MW of community solar projects per year over 7 years or 10 years.
- Rollout of up to 200MW of community solar projects per year over 7 years or 10 years.
- Rollout of up to 300MW of community solar projects per year over 7 years or 10 years.

The TEP service territory scenarios examined are as follows.

- Rollout of up to 30MW of community solar projects per year over 7 years or 10 years.
- Rollout of up to 60MW of community solar projects per year over 7 years or 10 years.
- Rollout of up to 90MW of community solar projects per year over 7 years or 10 years.

The number of solar projects constructed annually in each scenario is based on the experience of CCSA members across multiple markets, with some adjustments made to reflect the expertise of solar contractors in Arizona and the nature of the state's distribution grid and interconnection queue.

Seidman's analysis assumes that all projects are ground mount single axis tracking projects to both simplify the data set and align with the majority of community solar development across the country.

Section 2 summarizes the study method and key data inputs provided by CCSA and its partners.

Section 3 estimates single year economic impacts for the construction and operation of single 5MW and 10MW and 20MW solar projects in Arizona.

Section 4 estimates the statewide multi-year economic and fiscal impacts of the six community solar scenarios in the APS service territory, encompassing both the construction and operations phases.

Section 5 estimates the statewide multi-year economic and fiscal impacts of the six community solar scenarios in the TEP service territory, encompassing both the construction and operations phases.

The results will be used by CCSA in their discussions with the Arizona Corporation Commission and local utility companies as they seek to complement rooftop and utility-scale solar with community solar projects within the state.

## 1. ECONOMIC IMPACT MODELING AND DATA INPUTS

Economic impact analysis is an effective way of demonstrating the total contribution that an industry, new firm, or proposed project will make to a local, state, or national economy. For example, a firm **directly** affects the local economy through the jobs and wages paid to its staff, and the taxes it pays to local governments. **Indirect** effects arise through business-to-business transactions, when the firm's suppliers hire staff to fulfill their purchasing needs, or the suppliers purchase goods and services to fulfill the industry's needs. **Induced** effects occur when workers either directly or indirectly associated with the firm spend their incomes in the local economy. As the monies associated with supplier purchases and employee spending circulates through the economy, the impact of the initial job creation in the firm is therefore "multiplied."

This study makes use of an IMPLAN input-output model, customized by the Seidman Research Institute for the State of Arizona, to produce statewide economic and fiscal impact estimates for the construction and operation of three solar project sizes (5MW, 10MW and 20MW), and 12 community solar rollout scenarios in two public utility service territories.<sup>5</sup>

Seidman's modeling of economic impact extends across the construction and operations phases. Estimates are provided for both phases for each size of solar project and each community solar rollout scenario. Four measures of economic impact are provided. These are:

- **Employment:** this is a count of full- and part-time jobs, including wage/salary workers, and the self-employed.
- **Labor Income:** this includes all forms of employment income, including employee compensation (wages and benefits) and proprietor income.
- **Gross Domestic Product by State (State GDP):** this is synonymous with value added. It refers to Gross Domestic Product (GDP) at a national level. State GDP represents the dollar value of all goods and services produced for final demand in Arizona. It excludes the value of intermediate goods and services purchased as inputs to final production. It can also be defined as the sum of employee compensation (wages/salaries and benefits, including employer contributions to health insurance and retirement pensions), proprietor income, property income, and indirect business taxes.
- **Gross Output:** this is principally a measure of an industry's sales or receipts, which include sales to final users in the economy (State GDP), and sales to other industries (intermediate inputs).<sup>6</sup>

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<sup>5</sup> A 2020 edition of IMPLAN, based on the 2019 economy, has been used to avoid pandemic-related effects.

<sup>6</sup> Gross Output is useful as a facilitating variable in the mathematical solution of regional input-output models and appears to have been used in BBER's New Mexico study. However, it is also acknowledged to be an upward biased estimate of the effect of an economic activity on local area income. Value added (equivalent to State GDP) in IMPLAN is a conceptually more precise estimate of income. Caution should be exercised using Gross Output in any communications due to its inherent upward bias.

## Data Assumptions

Primary data is provided by CCSA from its members and partners for capital expenditure/supplier purchases, total expected direct employment, and wage and salary payments (including benefits) for each scenario by phase. This includes the amount of capital expenditure or supplier purchases placed with Arizona-based vendors, and any taxes paid to state and local governments. This data is shown in Tables 1 and 2. Table 1 summarizes the primary construction data inputs by solar project module size. Table 2 summarizes the primary operational data inputs by solar project module size. All monetary amounts are expressed in current (2022) dollars.

**Table 1: Construction Phase Direct Costs and Employment**

CONSTRUCTION PHASE DATA DESCRIPTION	5MW PROJECT	10MW PROJECT	20MW PROJECT
Construction Duration	0.5 years	0.625 years	0.75 years
Total Construction Employment	25 people	45 people	80 people
Total Construction Phase Employee Wages & Salaries	\$1,588,600	\$2,859,480	\$5,083,520.00
Total Construction Phase Employee Benefits	\$305,500	\$549,900	\$977,600
Total Construction Phase Employee Total Compensation	\$1,894,100	\$3,409,380	\$6,061,120
Total Construction Materials and Equipment Costs	\$4,625,000	\$9,250,000	\$18,500,000
Total Construction and Equipment Costs Spent in Arizona	14.9%	14.9%	14.9%
Land Acquisition Payment	\$8,000	\$10,000	\$15,000
Land Lease Agreement	\$20,000	\$50,000	\$120,000
Total State of Arizona Taxes & Fees	\$300	\$750	\$1,800
Total Local Government Taxes & Fees	\$15,000	\$37,500	\$90,000
Cost of Initial Customer Enrollment	\$520,000	\$975,000	\$1,820,000

Source: CCSA

**Table 2: Single Year Operations Direct Costs and Employment**

OPERATIONS PHASE DATA	5MW PROJECT	10MW PROJECT	20MW PROJECT
Operations Annual Employment	0.5 people	0.625 people	0.75 people
Operations Annual Employee Wages & Salaries	\$30,000	\$37,500	\$45,000
Construction Annual Employee Benefits	\$10,000	\$12,500	\$15,000
Operations Annual Employee Total Compensation	\$40,000	\$50,000	\$60,000
Annual Operations Materials and Equipment Costs	\$17,776	\$48,219.20	\$106,972.64
Annual Materials and Equipment Costs Spent in Arizona	90%	90%	90%
Annual Land Lease Agreement	\$40,000	\$80,000	\$160,000
Annual State of Arizona Taxes & Fees	\$600	\$1,200	\$2,400
Annual Local Government Taxes & Fees	\$30,000	\$60,000	\$120,000
Annual Cost of Customer Recruitment & Retention	\$42,250	\$78,000	\$143,000

Source: CCSA

Tables 3-5 show the hypothetical community solar rollout scenarios in the APS service territory. There are six different scenarios, as follows:

- Rollout of up to 100MW of community solar projects per year over 7 years or 10 years (Table 4).
- Rollout of up to 200MW of community solar projects per year over 7 years or 10 years (Table 5).
- Rollout of up to 300MW of community solar projects per year over 7 years or 10 years (Table 6).

Scenario #1 assumes that 100MW of annual solar project construction in the APS service territory is attained in year 3. An additional 100MW of solar projects are then repeated on an annual basis in years 4 through 7. By year 8, 540MW of community solar is assumed to be in operation in the APS service territory.

Scenario #2 assumes that 100MW of annual solar project construction in the APS service territory is also attained in year 3. An additional 100MW of solar projects are then repeated on an annual basis in years 4 through 10. By year 11, 840MW of community solar is assumed to be in operation in the APS service territory.

Scenario #3 assumes that 200MW of annual solar project construction in the APS service territory is attained in year 3. An additional 200MW of solar projects are then repeated on an annual basis in years 4 through 7. By year 8, 1,075MW of community solar is assumed to be in operation in the APS service territory.

Scenario #4 assumes that 200MW of annual solar project construction in the APS service territory is also attained in year 3. An additional 200MW of solar projects are then repeated on an annual basis in years 4 through 10. By year 11, 1,675MW of community solar is assumed to be in operation in the APS service territory.

Scenario #5 assumes that 300MW of annual solar project construction in the APS service territory is attained in year 3. An additional 300MW of solar projects are then repeated on an annual basis in years 4 through 7. By year 8, 1,620MW of community solar is assumed to be in operation in the APS service territory.

Scenario #6 assumes that 300MW of annual solar project construction in the APS service territory is also attained in year 3. An additional 300MW of solar projects are then repeated on an annual basis in years 4 through 10. By year 11, 2,520MW of community solar is assumed to be in operation in the APS service territory.

Solar projects usually have an industry standard expected lifespan of up to 25 years.<sup>7</sup> The annual operation of the solar panels will therefore continue beyond year 8 or year 11 in each APS service territory scenario.

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<sup>7</sup> Glover, E., and Saddler, L., (2022). How Long Do Solar Panels Last? [www.forbes.com](https://www.forbes.com/home-improvement/solar/how-long-do-solar-panels-last/). May 26, 2022. Available at: <https://www.forbes.com/home-improvement/solar/how-long-do-solar-panels-last/>

**Table 3: APS 100MW of Community Solar 7- and 10-Year Scenarios**

SCENARIO	NUMBER OF SOLAR PROJECTS																				
DETAILS	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12-26	Y27	Y28	Y29	Y30	Y31	Y32	Y33	Y34	Y35
<b>SCENARIO #1</b>																					
<b>CONSTRUCTION</b>																					
5MW	1	5	8	8	8	8	8														
10MW	0	1	2	2	2	2	2														
20MW	0	0	2	2	2	2	2														
<b>OPERATIONS</b>																					
5MW	0	1	6	14	22	30	38	46	46	46	46	46	45	40	32	24	16	8			
10MW	0	0	1	3	5	7	9	11	11	11	11	11	11	10	8	6	4	2			
20MW	0	0	0	2	4	6	8	10	10	10	10	10	10	10	8	6	4	2			
<b>SCENARIO #2</b>																					
<b>CONSTRUCTION</b>																					
5MW	1	5	8	8	8	8	8	8	8	8											
10MW	0	1	2	2	2	2	2	2	2	2											
20MW	0	0	2	2	2	2	2	2	2	2											
<b>OPERATIONS</b>																					
5MW	0	1	6	14	22	30	38	46	54	62	70	70	69	64	56	48	40	32	24	16	8
10MW	0	0	1	3	5	7	9	11	13	15	17	17	17	16	14	12	10	8	6	4	2
20MW	0	0	0	2	4	6	8	10	12	14	16	16	16	16	14	12	10	8	6	4	2

Source: CCSA

Table 4: APS 200MW of Community Solar 7- and 10-Year Scenarios

SCENARIO	NUMBER OF SOLAR PROJECTS																				
DETAILS	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12-26	Y27	Y28	Y29	Y30	Y31	Y32	Y33	Y34	Y35
<b>SCENARIO #3</b>																					
<b>CONSTRUCTION</b>																					
5MW	2	5	16	16	16	16	16														
10MW	0	2	4	4	4	4	4														
20MW	0	1	4	4	4	4	4														
<b>OPERATIONS</b>																					
5MW	0	2	7	23	39	55	71	87	87	87	87	87	85	80	64	48	32	16			
10MW	0	0	2	6	10	14	18	22	22	22	22	22	22	20	16	12	8	4			
20MW	0	0	1	5	9	13	17	21	21	21	21	21	21	20	16	12	8	4			
<b>SCENARIO #4</b>																					
<b>CONSTRUCTION</b>																					
5MW	2	5	16	16	16	16	16	16	16	16											
10MW	0	2	4	4	4	4	4	4	4	4											
20MW	0	1	4	4	4	4	4	4	4	4											
<b>OPERATIONS</b>																					
5MW	0	2	7	23	39	55	71	87	103	119	135	135	133	128	112	96	80	64	48	32	16
10MW	0	0	2	6	10	14	18	22	26	30	34	34	34	32	28	24	20	16	12	8	4
20MW	0	0	1	5	9	13	17	21	25	29	33	33	33	32	28	24	20	16	12	8	4

Source: CCSA

Table 5: APS 300MW of Community Solar 7- and 10-Year Scenarios

SCENARIO	NUMBER OF SOLAR PROJECTS																				
DETAILS	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12-26	Y27	Y28	Y29	Y30	Y31	Y32	Y33	Y34	Y35
<b>SCENARIO #5</b>																					
<b>CONSTRUCTION</b>																					
5MW	4	10	24	24	24	24	24														
10MW	0	3	6	6	6	6	6														
20MW	0	1	6	6	6	6	6														
<b>OPERATIONS</b>																					
5MW	0	4	14	38	62	86	110	134	134	134	134	134	130	120	96	72	48	24			
10MW	0	0	3	9	15	21	27	33	33	33	33	33	33	30	24	18	12	6			
20MW	0	0	1	7	13	19	25	31	31	31	31	31	31	30	24	18	12	6			
<b>SCENARIO #6</b>																					
<b>CONSTRUCTION</b>																					
5MW	4	10	24	24	24	24	24	24	24	24											
10MW	0	3	6	6	6	6	6	6	6	6											
20MW	0	1	6	6	6	6	6	6	6	6											
<b>OPERATIONS</b>																					
5MW	0	4	14	38	62	86	110	134	158	182	206	206	202	192	168	144	120	96	72	48	24
10MW	0	0	3	9	15	21	27	33	39	45	51	51	51	48	42	36	30	24	18	12	6
20MW	0	0	1	7	13	19	25	31	37	43	49	49	49	48	42	36	30	24	18	12	6

Source: CCSA

Tables 6-8 show the hypothetical community solar rollout scenarios in the TEP service territory. There are six different scenarios, as follows:

- Rollout of up to 30MW of community solar projects per year over 7 years or 10 years (Table 6).
- Rollout of up to 60MW of community solar projects per year over 7 years or 10 years (Table 7).
- Rollout of up to 90MW of community solar projects per year over 7 years or 10 years (Table 8).

Scenario #7 assumes that 30MW of annual solar project construction in the TEP service territory is attained in year 3. An additional 30MW of solar projects are then repeated on an annual basis in years 4 through 7. By year 8, 165MW of community solar is assumed to be in operation in the TEP service territory.

Scenario #8 assumes that 30MW of annual solar project construction in the TEP service territory is also attained in year 3. An additional 30MW of solar projects are then repeated on an annual basis in years 4 through 10. By year 11, 255MW of community solar is assumed to be in operation in the TEP service territory.

Scenario #9 assumes that 60MW of annual solar project construction in the TEP service territory is attained in year 3. An additional 60MW of solar projects are then repeated on an annual basis in years 4 through 7. By year 8, 335MW of community solar is assumed to be in operation in the TEP service territory.

Scenario #10 assumes that 60MW of annual solar project construction in the TEP service territory is also attained in year 3. An additional 60MW of solar projects are then repeated on an annual basis in years 4 through 10. By year 11, 515MW of community solar is assumed to be in operation in the TEP service territory.

Scenario #11 assumes that 90MW of annual solar project construction in the TEP service territory is attained in year 3. An additional 90MW of solar projects are then repeated on an annual basis in years 4 through 7. By year 8, 515MW of community solar is assumed to be in operation in the TEP service territory.

Scenario #12 assumes that 90MW of annual solar project construction in the TEP service territory is also attained in year 3. An additional 90MW of solar projects are then repeated on an annual basis in years 4 through 10. By year 11, 785MW of community solar is assumed to be in operation in the TEP service territory.

Again, solar projects usually have an industry standard expected lifespan of up to 25 years.<sup>8</sup> The annual operation of the solar panels will therefore continue beyond year 8 or year 11 in each TEP service territory scenario.

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<sup>8</sup> Glover, E., and Saddler, L., (2022). How Long Do Solar Panels Last? [www.forbes.com](https://www.forbes.com/home-improvement/solar/how-long-do-solar-panels-last/). May 26, 2022. Available at: <https://www.forbes.com/home-improvement/solar/how-long-do-solar-panels-last/>

Table 6: TEP 30MW of Community Solar 7- and 10-Year Scenarios

SCENARIO	NUMBER OF SOLAR PROJECTS																				
DETAILS	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12-26	Y27	Y28	Y29	Y30	Y31	Y32	Y33	Y34	Y35
SCENARIO #7																					
CONSTRUCTION																					
5MW	1	2	4	4	4	4	4														
10MW	0	0	1	1	1	1	1														
20MW	0	0	0	0	0	0	0														
OPERATIONS																					
5MW	0	1	3	7	11	15	19	23	23	23	23	23	22	20	16	12	8	4			
10MW	0	0	0	1	2	3	4	5	5	5	5	5	5	5	4	3	2	1			
20MW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
SCENARIO #8																					
CONSTRUCTION																					
5MW	1	2	4	4	4	4	4	4	4	4											
10MW	0	0	1	1	1	1	1	1	1	1											
20MW	0	0	0	0	0	0	0	0	0	0											
OPERATIONS																					
5MW	0	1	3	7	11	15	19	23	27	31	35	35	34	32	28	24	20	16	12	8	4
10MW	0	0	0	1	2	3	4	5	6	7	8	8	8	8	7	6	5	4	3	2	1
20MW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Source: CCSA

Table 7: TEP 60MW of Community Solar 7- and 10-Year Scenarios

SCENARIO	NUMBER OF SOLAR PROJECTS																				
DETAILS	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12-26	Y27	Y28	Y29	Y30	Y31	Y32	Y33	Y34	Y35
<b>SCENARIO #9</b>																					
<b>CONSTRUCTION</b>																					
5MW	2	3	4	4	4	4	4														
10MW	0	1	2	2	2	2	2														
20MW	0	0	1	1	1	1	1														
<b>OPERATIONS</b>																					
5MW	0	2	5	9	13	17	21	25	25	25	25	25	23	20	16	12	8	4			
10MW	0	0	1	3	5	7	9	11	11	11	11	11	11	10	8	6	4	2			
20MW	0	0	0	1	2	3	4	5	5	5	5	5	5	5	4	3	2	1			
<b>SCENARIO #10</b>																					
<b>CONSTRUCTION</b>																					
5MW	2	3	4	4	4	4	4	4	4	4											
10MW	0	1	2	2	2	2	2	2	2	2											
20MW	0	0	1	1	1	1	1	1	1	1											
<b>OPERATIONS</b>																					
5MW	0	2	5	9	13	17	21	25	29	33	37	37	35	32	28	24	20	16	12	8	4
10MW	0	0	1	3	5	7	9	11	13	15	17	17	17	16	14	12	10	8	6	4	2
20MW	0	0	0	1	2	3	4	5	6	7	8	8	8	8	7	6	5	4	3	2	1

Source: CCSA

Table 8: TEP 90MW of Community Solar 7- and 10-Year Scenarios

SCENARIO	NUMBER OF SOLAR PROJECTS																				
DETAILS	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12-26	Y27	Y28	Y29	Y30	Y31	Y32	Y33	Y34	Y35
<b>SCENARIO #11</b>																					
<b>CONSTRUCTION</b>																					
5MW	3	6	10	6	6	6	6														
10MW	0	2	2	2	2	2	2														
20MW	0	0	1	2	2	2	2														
<b>OPERATIONS</b>																					
5MW	0	3	9	19	25	31	37	43	43	43	43	43	40	34	24	18	12	6			
10MW	0	0	2	4	6	8	10	12	12	12	12	12	12	10	8	6	4	2			
20MW	0	0	0	1	3	5	7	9	9	9	9	9	9	9	8	6	4	2			
<b>SCENARIO #12</b>																					
<b>CONSTRUCTION</b>																					
5MW	3	6	10	6	6	6	6	6	6	6											
10MW	0	2	2	2	2	2	2	2	2	2											
20MW	0	0	1	2	2	2	2	2	2	2											
<b>OPERATIONS</b>																					
5MW	0	3	9	19	25	31	37	43	49	55	61	61	58	52	42	36	30	24	18	12	6
10MW	0	0	2	4	6	8	10	12	14	16	18	18	18	16	14	12	10	8	6	4	2
20MW	0	0	0	1	3	5	7	9	11	13	15	15	15	15	14	12	10	8	6	4	2

Source: CCSA

## 2. SINGLE-YEAR ECONOMIC AND FISCAL IMPACTS OF THREE SOLAR PROJECTS

### The Economic and Fiscal Impacts of a 5MW Solar Project

Table 9 summarizes the economic and fiscal impacts of the construction of a single 5MW solar project in the State of Arizona. The construction phase is assumed to take 6 months. All dollar amounts are expressed in current (nominal) dollars.

**Table 9: The Economic and Fiscal Impacts of the Construction of a 5MW Solar Project<sup>9</sup>**

	STATE GDP (\$)	EMPLOYMENT (Job Years) <sup>10</sup>	LABOR INCOME (\$)	GROSS OUTPUT (\$)
Direct Economic and Fiscal Impacts	\$1,909,400	12.5	\$1,894,100	\$2,326,965
Indirect Economic Impacts	\$754,540	11.1	\$622,203	\$1,629,970
Induced Economic Impacts	\$1,886,006	18.8	\$1,067,389	\$3,175,040
Induced Effects of Tax Spendings	\$623,303	6.7	\$470,549	\$790,502
<b>Total Impacts</b>	<b>\$5,173,249</b>	<b>49.1</b>	<b>\$4,054,241</b>	<b>\$7,922,478</b>

*Source: Authors' Calculations*

The first line of Table 9 estimates the direct economic and fiscal impacts associated with the installation of a 5MW solar project. The direct effects refer to the number of people employed to construct the solar project, the wages and salaries that they receive, and any state or local taxes paid as a direct result of this construction phase. This is estimated at more than \$1.9 million State GDP, 12.5 job years employment, and approximately \$1.9 million labor income. The labor income figure is a broad measure of compensation paid to the 25 construction workers that are employed for 6 months, all of whom are assumed to live in the state. In addition to labor income, the GDP figure includes \$15,300 in taxes paid directly to state and local governments in Arizona.

The second line of Table 9 estimates the indirect economic impacts. These are the changes in sales, income, or employment within the State of Arizona among vendors supplying goods and services to the solar project construction, and the impacts on the local suppliers of those vendors. The CCSA and its partners estimate that the materials and equipment needed to construct a 5MW solar project will cost \$4.6 million, of which 14.9% is spent with Arizona-based vendors. In addition, there is an \$8,000 land acquisition cost, a \$40,000 annual land lease, and a \$520,000 customer acquisition cost. The indirect impacts of business-to-business transactions is estimated at \$754,540 State GDP, 11.1 job years employment, and \$622,203 labor income.

The third line of Table 9 estimates the induced economic effects of the construction workers and the workers of suppliers spending their wages on other things within the State of Arizona, such as entertainment, healthcare, retail,

<sup>9</sup> Columns may not tally exactly due to rounding.

<sup>10</sup> A job year is a job that is held for 12 consecutive months. For multi-year studies, it is not a synonym for a job. For example, a person working at ASU for five consecutive years has one job but five job years employment.

etc. The spending of these dollars within the local economy helps to generate sales, income, and employment elsewhere in Arizona. The induced economic impacts of consumer expenditure are estimated at approximately \$1.9 million State GDP, 18.8 job years employment, and approximately \$1.1 million labor income.

The fourth line of Table 9 estimates the induced economic impacts of the spending of new state and local government tax revenues directly and indirectly associated with the construction of a 5MW solar project. In addition to the \$15,300 state and local direct tax payments made during the construction phase, Seidman estimates a further \$362,663 in state and local tax payments associated with construction workers, vendor purchases, and the consumer expenditures of construction and supplier employees. The spending of these \$377,963 total state and local tax dollars is responsible for \$623,303 State GDP, 6.7 job years employment, and \$470,549 labor income in the State of Arizona.

The fifth line of Table 9 estimates the total economic and fiscal impacts of the construction of a 5MW solar project. The total impacts are the sum of all direct, indirect, and induced effects. The total construction phase impacts are estimated at approximately \$5.2 million State GDP, 49.1 job years employment, and approximately \$4.1 million labor income.

Table 10 summarizes economic and fiscal impacts of the operation of a single 5MW solar project for a *single year* in the State of Arizona. All dollar amounts are again expressed in current (nominal) dollars.

**Table 10: The Economic and Fiscal Impacts of the Operation of a 5MW Solar Project for a Single Year**

	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)	GROSS OUTPUT (\$)
Direct Economic and Fiscal Impacts	\$70,600	0.5	\$40,000	\$306,975
Indirect Economic Impacts	\$69,406	1.2	\$57,960	\$142,615
Induced Economic Impacts	\$68,855	0.7	\$39,831	\$114,925
Induced Effects of Tax Spendings	\$73,973	0.8	\$55,845	\$93,817
<b>Total Impacts</b>	<b>\$282,834</b>	<b>3.2</b>	<b>\$193,636</b>	<b>\$658,332</b>

*Source: Authors' Calculations*

The first line of Table 10 estimates the direct economic and fiscal impacts associated with the operation of a 5MW solar project in a single year. This is estimated at \$70,600 State GDP, 0.5 job years employment, and \$40,000 labor income per year. In addition to labor income, the GDP figure includes \$30,600 in annual taxes paid directly to state and local governments in Arizona.

The second line of Table 10 estimates the indirect economic impacts for a single year. The CCSA and its partners estimate that the materials and equipment needed to operate a 5MW solar project will cost \$17,776 per year, of which 90% is spent with Arizona-based vendors. In addition, there is a \$40,000 annual land lease, and a \$42,250

annual customer recruitment and retention cost. The annual indirect impacts of business-to-business transactions is therefore estimated at \$69,406 State GDP, 1.2 job years employment, and \$57,960 labor income.

The third line of Table 10 estimates the annual induced economic effects of operations worker(s) and the workers of their suppliers spending their earnings on other things within the State of Arizona. The annual induced economic impacts are estimated at \$68,855 State GDP, 0.7 job years employment, and \$39,831 labor income.

The fourth line of Table 10 estimates the induced economic impacts of the spending of new state and local government tax revenues directly and indirectly associated with the annual operation of a 5MW solar project. In addition to the \$30,600 state and local direct tax payments made during each year of operation, Seidman estimates a further \$14,257 in state and local tax payments associated with construction workers, vendor purchases, and the consumer expenditures of construction and supplier employees each year. The spending of these \$44,857 annual state and local tax dollars is responsible for \$73,973 State GDP, 0.8 job years employment, and \$55,845 labor income per year in the State of Arizona.

The fifth line of Table 10 estimates the total annual economic and fiscal impacts of the operation of a 5MW solar project. The total annual impacts are the sum of all direct, indirect, and induced effects in a single year. The total annual operations impacts are estimated at \$282,834 State GDP, 3.2 job years employment, and \$193,636 labor income.

**Table 11: The Lifetime Economic and Fiscal Impacts of the Construction and Operation of a 5MW Solar Project<sup>11</sup>**

PHASE	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)	GROSS OUTPUT (\$)
Total Construction Phase Impacts	\$5,173,249	49.1	\$4,054,241	\$7,922,478
Total Operations Phase Impacts	\$7,070,852	79.2	\$4,840,897	\$16,458,290
<b>Total Construction and Operations Phases Impacts</b>	<b>\$12,244,101</b>	<b>128.3</b>	<b>\$8,895,138</b>	<b>\$24,380,767</b>

*Source: Authors' Calculations*

A single solar project will on average operate for up to 25 years. Table 11 therefore estimates the lifetime economic and fiscal impacts of the construction and operation of a 5MW solar project in the State of Arizona. Seidman estimates that the total lifetime economic and fiscal impacts of a 5MW solar project in the State of Arizona are more than \$12.2 million State GDP, 128.3 job years employment, and approximately \$8.9 million labor income. These impacts assume 0.5 years to construct the 5MW solar project in the state, and 25 subsequent years of operations.

<sup>11</sup> Columns may not tally exactly due to rounding.

## The Economic and Fiscal Impacts of a 10MW Solar Project

Table 12 summarizes the economic and fiscal impacts of the construction of a single 10MW solar project in the State of Arizona. The construction phase is assumed to take 7.5 months. All dollar amounts are expressed in current (nominal) dollars.

**Table 12: The Economic and Fiscal Impacts of the Construction of a 10MW Solar Project**

	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)	GROSS OUTPUT (\$)
Direct Economic and Fiscal Impacts	\$3,447,630	28.1	\$3,409,380	\$5,235,672
Indirect Economic Impacts	\$1,464,649	21.1	\$1,194,831	\$3,176,664
Induced Economic Impacts	\$3,462,037	34.5	\$1,960,803	\$5,827,461
Induced Effects of Tax Spendings	\$1,162,516	12.5	\$877,616	\$1,474,359
<b>Total Impacts</b>	<b>\$9,536,832</b>	<b>96.2</b>	<b>\$7,442,630</b>	<b>\$15,714,156</b>

*Source: Authors' Calculations*

The first line of Table 12 estimates the direct economic and fiscal impacts associated with the installation of a 10MW solar project. The direct effects refer to the number of people employed to construct the solar project, the wages and salaries that they receive, and any state or local taxes paid as a direct result of this construction phase. This is estimated at more than \$3.4 million State GDP, 28.1 job years employment, and \$3.4 million labor income. The labor income figure is a broad measure of compensation paid to the 45 construction workers that are employed for 7.5 months, all of whom are assumed to live in the state. In addition to labor income, the GDP figure includes \$38,250 in taxes paid directly to state and local governments in Arizona.

The second line of Table 12 estimates the indirect economic impacts. These are the changes in sales, income, or employment within the State of Arizona among vendors supplying goods and services to the solar project construction, and the impacts on the local suppliers of those vendors. The CCSA and its partners estimate that the materials and equipment needed to construct a 10MW solar project will cost more than \$9.2 million, of which 14.9% is spent with Arizona-based vendors. In addition, there is an \$10,000 land acquisition cost, a \$80,000 annual land lease, and a \$975,000 customer acquisition cost. The indirect impacts of business-to-business transactions is estimated at more than \$1.4 million State GDP, 21.1 job years employment, and approximately \$1.2 million labor income.

The third line of Table 12 estimates the induced economic effects of the construction workers and the workers of suppliers spending their wages on other things within the State of Arizona, such as entertainment, healthcare, retail, etc. The induced economic impacts of consumer expenditure are estimated at approximately \$3.5 million State GDP, 34.5 job years employment, and approximately \$2.0 million labor income.

The fourth line of Table 12 estimates the induced economic impacts of the spending of new state and local government tax revenues directly and indirectly associated with the construction of a 10MW solar project. In addition to the \$38,250 state and local direct tax payments made during the construction phase, Seidman estimates a further \$666,686 in state and local tax payments associated with construction workers, vendor purchases, and the consumer expenditures of construction and supplier employees. The spending of these \$704,936 total state and local tax dollars is responsible for approximately \$1.2 million State GDP, 12.5 job years employment, and \$877,616 labor income in the State of Arizona.

The fifth line of Table 12 estimates the total economic and fiscal impacts of the construction of a 10MW solar project. The total impacts are the sum of all direct, indirect, and induced effects. The total construction phase impacts are estimated at more than \$9.5 million State GDP, 96.2 job years employment, and more than \$7.4 million labor income.

Table 13 summarizes economic and fiscal impacts of the operation of a single 10MW solar project for a *single year* in the State of Arizona. All dollar amounts are again expressed in current (nominal) dollars.

**Table 13: The Economic and Fiscal Impacts of the Operation of a 10MW Solar Project for a Single Year<sup>12</sup>**

	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)	GROSS OUTPUT (\$)
Direct Economic and Fiscal Impacts	\$111,200	0.6	\$50,000	\$383,719
Indirect Economic Impacts	\$142,673	2.4	\$120,095	\$290,441
Induced Economic Impacts	\$124,494	1.2	\$72,326	\$207,484
Induced Effects of Tax Spendings	\$142,756	1.5	\$107,771	\$181,050
<b>Total Impacts</b>	<b>\$521,123</b>	<b>5.8</b>	<b>\$350,192</b>	<b>\$1,062,694</b>

*Source: Authors' Calculations*

The first line of Table 13 estimates the direct economic and fiscal impacts associated with the operation of a 10MW solar project in a single year. This is estimated at \$111,200 State GDP, 0.6 job years employment, and \$50,000 labor income per year. In addition to labor income, the GDP figure includes \$61,200 in annual taxes paid directly to state and local governments in Arizona.

The second line of Table 13 estimates the indirect economic impacts for a single year. The CCSA and its partners estimate that the materials and equipment needed to operate a 10MW solar project will cost \$48,219.20 per year, of which 90% is spent with Arizona-based vendors. In addition, there is a \$80,000 annual land lease, and a \$78,000 annual customer recruitment and retention cost. The annual indirect impacts of business-to-business transactions is therefore estimated at \$142,673 State GDP, 2.4 job years employment, and \$120,095 labor income.

<sup>12</sup> Columns may not tally exactly due to rounding.

The third line of Table 13 estimates the annual induced economic effects of operations worker(s) and the workers of their suppliers spending their earnings on other things within the State of Arizona. The annual induced economic impacts are estimated at \$124,494 State GDP, 1.2 job years employment, and \$72,326 labor income.

The fourth line of Table 13 estimates the induced economic impacts of the spending of new state and local government tax revenues directly and indirectly associated with the annual operation of a 10MW solar project. In addition to the \$61,200 state and local direct tax payments made during each year of operation, Seidman estimates a further \$25,366 in state and local tax payments associated with construction workers, vendor purchases, and the consumer expenditures of construction and supplier employees each year. The spending of these \$86,566 annual state and local tax dollars is responsible for \$142,756 State GDP, 1.5 job years employment, and \$107,771 labor income per year in the State of Arizona.

The fifth line of Table 13 estimates the total annual economic and fiscal impacts of the operation of a 10MW solar project. The total annual impacts are the sum of all direct, indirect, and induced effects in a single year. The total annual operations impacts are estimated at \$521,123 State GDP, 5.8 job years employment, and \$350,192 labor income.

**Table 14: The Lifetime Economic and Fiscal Impacts of the Construction and Operation of a 10MW Solar Project**

<sup>13</sup>

PHASE	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)	GROSS OUTPUT (\$)
Total Construction Phase Impacts	\$9,536,832	96.2	\$7,442,630	\$15,714,156
Total Operations Phase Impacts	\$13,028,075	144.6	\$8,754,810	\$26,567,357
<b>Total Construction and Operations Phases Impacts</b>	<b>\$22,564,907</b>	<b>240.8</b>	<b>\$16,197,440</b>	<b>\$42,281,512</b>

*Source: Authors' Calculations*

A single solar project will on average operate for up to 25 years. Table 14 therefore estimates the lifetime economic and fiscal impacts of the construction and operation of a 10MW solar project in the State of Arizona. Seidman estimates that the total lifetime economic and fiscal impacts of a 10MW solar project in the State of Arizona are approximately \$22.6 million State GDP, 240.8 job years employment, and approximately \$16.2 million labor income. These impacts assume 7.5 months to construct the 10MW solar project in the state, and 25 subsequent years of operations.

<sup>13</sup> Columns may not tally exactly due to rounding.

## The Economic and Fiscal Impacts of a 20MW Solar Project

Table 15 summarizes the economic and fiscal impacts of the construction of a single 20MW solar project in the State of Arizona. The construction phase is assumed to take 9 months. All dollar amounts are expressed in current (nominal) dollars.

**Table 15: The Economic and Fiscal Impacts of the Construction of a 20MW Solar Project<sup>14</sup>**

	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)	GROSS OUTPUT (\$)
Direct Economic and Fiscal Impacts	\$6,152,920	60.0	\$6,061,120	\$11,169,434
Indirect Economic Impacts	\$2,845,120	40.2	\$2,292,609	\$6,198,046
Induced Economic Impacts	\$6,306,819	62.8	\$3,575,273	\$10,614,199
Induced Effects of Tax Spendings	\$2,157,828	23.3	\$1,629,005	\$2,736,661
<b>Total Impacts</b>	<b>\$17,462,687</b>	<b>186.2</b>	<b>\$13,558,007</b>	<b>\$30,718,339</b>

*Source: Authors' Calculations*

The first line of Table 15 estimates the direct economic and fiscal impacts associated with the installation of a 20MW solar project. The direct effects refer to the number of people employed to construct the solar project, the wages and salaries that they receive, and any state or local taxes paid as a direct result of this construction phase. This is estimated at approximately \$6.2 million State GDP, 60.0 job years employment, and approximately \$6.1 million labor income. The labor income figure is a broad measure of compensation paid to the 80 construction workers that are employed for 9 months, all of whom are assumed to live in the state. In addition to labor income, the GDP figure includes \$91,800 in taxes paid directly to state and local governments in Arizona.

The second line of Table 15 estimates the indirect economic impacts. These are the changes in sales, income, or employment within the State of Arizona among vendors supplying goods and services to the solar project construction, and the impacts on the local suppliers of those vendors. The CCSA and its partners estimate that the materials and equipment needed to construct a 20MW solar project will cost \$18.5 million, of which 14.9% is spent with Arizona-based vendors. In addition, there is a \$15,000 land acquisition cost, a \$160,000 annual land lease, and a \$1.8 million customer acquisition cost. The indirect impacts of business-to-business transactions is estimated at more than \$2.8 million State GDP, 40.2 job years employment, and approximately \$2.3 million labor income.

The third line of Table 15 estimates the induced economic effects of the construction workers and the workers of suppliers spending their wages on other things within the State of Arizona, such as entertainment, healthcare, retail, etc. The induced economic impacts of consumer expenditure are estimated at approximately \$6.3 million State GDP, 62.8 job years employment, and approximately \$3.6 million labor income.

<sup>14</sup> Columns may not tally exactly due to rounding.

The fourth line of Table 15 estimates the induced economic impacts of the spending of new state and local government tax revenues directly and indirectly associated with the construction of a 20MW solar project. In addition to the \$91,800 state and local direct tax payments made during the construction phase, Seidman estimates a further \$1.2 million in state and local tax payments associated with construction workers, vendor purchases, and the consumer expenditures of construction and supplier employees. The spending of these \$1.3 million total state and local tax dollars is responsible for approximately \$2.2 million State GDP, 23.3 job years employment, and more than \$1.6 million labor income in the State of Arizona.

The fifth line of Table 15 estimates the total economic and fiscal impacts of the construction of a 20MW solar project. The total impacts are the sum of all direct, indirect, and induced effects. The total construction phase impacts are estimated at approximately \$17.5 million State GDP, 186.2 job years employment, and approximately \$13.6 million labor income.

Table 16 summarizes economic and fiscal impacts of the operation of a single 20MW solar project for a *single year* in the State of Arizona. All dollar amounts are again expressed in current (nominal) dollars.

**Table 16: The Economic and Fiscal Impacts of the Operation of a 20MW Solar Project for a Single Year**

	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)	GROSS OUTPUT (\$)
Direct Economic and Fiscal Impacts	\$182,400	0.8	\$60,000	\$460,462
Indirect Economic Impacts	\$283,054	4.6	\$237,731	\$574,734
Induced Economic Impacts	\$225,758	2.2	\$131,609	\$375,873
Induced Effects of Tax Spendings	\$276,871	3.0	\$209,018	\$351,141
<b>Total Impacts</b>	<b>\$968,083</b>	<b>10.6</b>	<b>\$638,358</b>	<b>\$1,762,210</b>

*Source: Authors' Calculations*

The first line of Table 16 estimates the direct economic and fiscal impacts associated with the operation of a 20MW solar project in a single year. This is estimated at \$182,400 State GDP, 0.8 job years employment, and \$60,000 labor income per year. In addition to labor income, the GDP figure includes \$122,400 in annual taxes paid directly to state and local governments in Arizona.

The second line of Table 16 estimates the indirect economic impacts for a single year. The CCSA and its partners estimate that the materials and equipment needed to operate a 20MW solar project will cost \$106,972.64 per year, of which 90% is spent with Arizona-based vendors. In addition, there is a \$160,000 annual land lease, and a \$143,000 annual customer recruitment and retention cost. The annual indirect impacts of business-to-business transactions is therefore estimated at \$283,054 State GDP, 4.6 job years employment, and \$237,731 labor income.

The third line of Table 16 estimates the annual induced economic effects of operations worker(s) and the workers of their suppliers spending their earnings on other things within the State of Arizona. The annual induced economic impacts are estimated at \$225,758 State GDP, 2.2 job years employment, and \$131,609 labor income.

The fourth line of Table 16 estimates the induced economic impacts of the spending of new state and local government tax revenues directly and indirectly associated with the annual operation of a 20MW solar project. In addition to the \$122,400 state and local direct tax payments made during each year of operation, Seidman estimates a further \$45,491 in state and local tax payments associated with construction workers, vendor purchases, and the consumer expenditures of construction and supplier employees each year. The spending of these \$167,891 annual state and local tax is responsible for \$276,871 State GDP, 3.0 job years employment, and \$209,018 labor income per year in the State of Arizona.

The fifth line of Table 16 estimates the total annual economic and fiscal impacts of the operation of a 20MW solar project. The total annual impacts are the sum of all direct, indirect, and induced effects in a single year. The total annual operations impacts are estimated at \$968,083 State GDP, 10.6 job years employment, and \$638,358 labor income.

**Table 17: The Lifetime Economic and Fiscal Impacts of the Construction and Operation of a 20MW Solar Project**

PHASE	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)	GROSS OUTPUT (\$)
Total Construction Phase Impacts	\$17,462,687	186.2	\$13,558,007	\$30,718,339
Total Operations Phase Impacts	\$24,202,072	265.6	\$15,958,952	\$44,055,243
<b>Total Construction and Operations Phases Impacts</b>	<b>\$41,664,759</b>	<b>451.8</b>	<b>\$29,516,959</b>	<b>\$74,773,582</b>

*Source: Authors' Calculations*

A single solar project will on average operate for up to 25 years. Table 17 therefore estimates the lifetime economic and fiscal impacts of the construction and operation of a 20MW solar project in the State of Arizona. Seidman estimates that the total lifetime economic and fiscal impacts of a 20MW solar project in the State of Arizona are approximately \$41.7 million State GDP, 451.8 job years employment, and more than \$29.5 million labor income. These impacts assume 9 months to construct the 20MW solar project in the state, and 25 subsequent years of operations.

### 3. LIFETIME IMPACTS OF SIX COMMUNITY SOLAR SCENARIOS IN THE APS SERVICE TERRITORY

Arizona Public Service (APS) serves more than 1.3 million homes and businesses in 11 of Arizona's 15 counties. Their service territory stretches from the border town of Douglas in the south to the Grand Canyon in the north, Gila Bend in the west, and Payson in the east. A map of their current service territory is shown in Figure 1.

CCSA has provided six scenarios (Scenarios #1-6) to investigate the statewide implications of rolling out 100MW, 200MW and 300MW per year community solar programs in the APS service territory over a 7- or a 10-year time horizon, based on the mix of 5MW, 10MW and 20MW solar projects previously described in Section 2 (see Tables 3-5). The number of solar projects constructed annually in each scenario is based on the experience of CCSA members across multiple markets, with some adjustments made to reflect the expertise of solar contractors in Arizona and the nature of the state's distribution grid and interconnection queue. Each installed solar project included as part of a scenario is assumed to operate for 25 years.

Scenario #1 assumes that 100MW annual solar project construction in the APS service territory is attained in year 3. An additional 100MW of solar projects are then repeated on an annual basis in years 4 through 7. By year 8, 540MW of community solar is assumed to be in operation in the APS service territory.

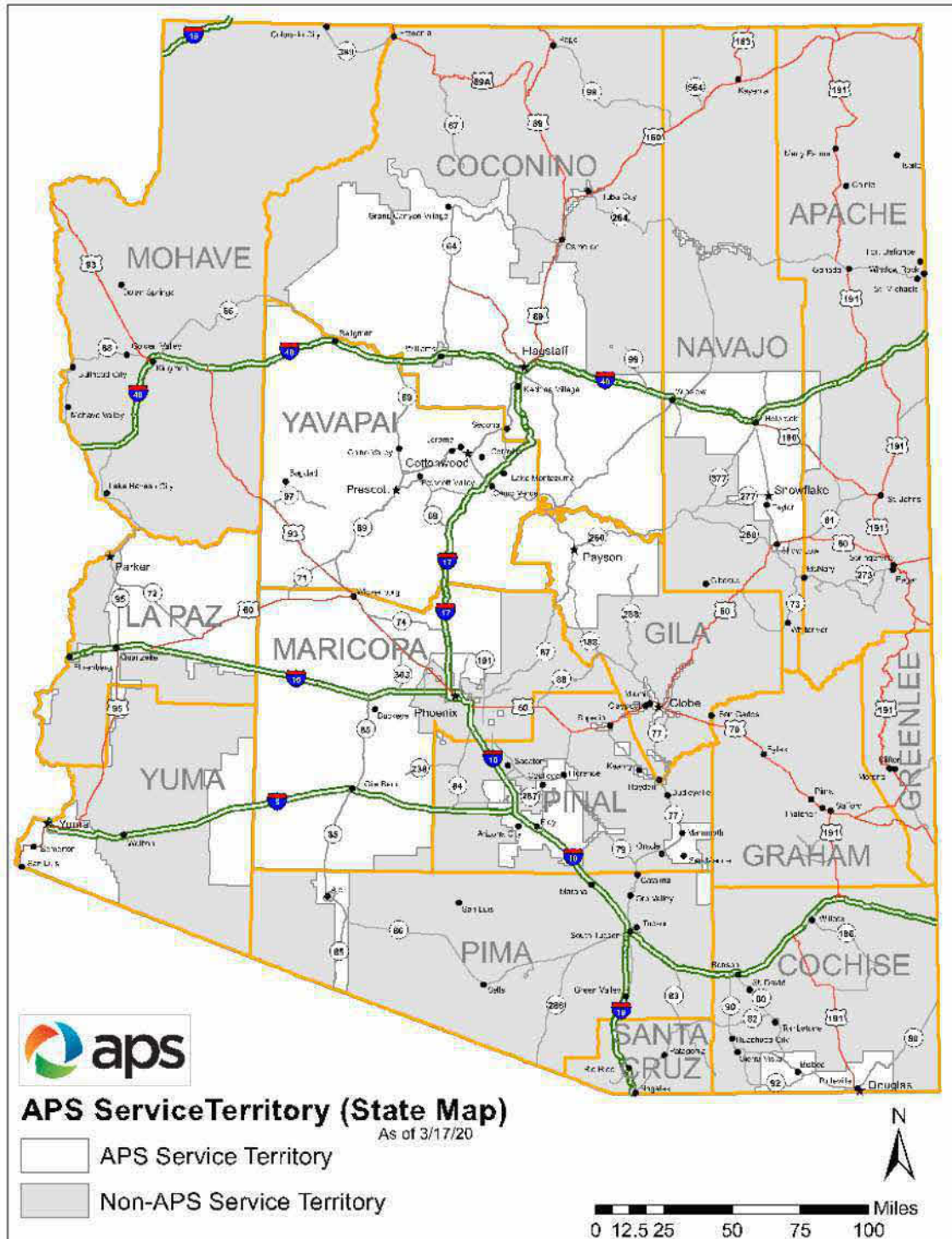
Scenario #2 assumes that 100MW annual solar project construction in the APS service territory is also attained in year 3. An additional 100MW of solar projects are then repeated on an annual basis in years 4 through 10. By year 11, 840MW of community solar is assumed to be in operation in the APS service territory.

Scenario #3 assumes that 200MW annual solar project construction in the APS service territory is attained in year 3. An additional 200MW of solar projects are then repeated on an annual basis in years 4 through 7. By year 8, 1,075MW of community solar is assumed to be in operation in the APS service territory.

Scenario #4 assumes that 200MW annual solar project construction in the APS service territory is also attained in year 3. An additional 200MW of solar projects are then repeated on an annual basis in years 4 through 10. By year 11, 1,675MW of community solar is assumed to be in operation in the APS service territory.

Scenario #5 assumes that 300MW annual solar project construction in the APS service territory is attained in year 3. An additional 300MW of solar projects are then repeated on an annual basis in years 4 through 7. By year 8, 1,620MW of community solar is assumed to be in operation in the APS service territory.

Figure 1: APS' Current Service Territory



Source: APS<sup>15</sup>

<sup>15</sup> APS, (2022). [www.aps.com](https://www.aps.com). Available at: [https://www.aps.com/-/media/APS/APSCOM-PDFs/Residential/Service-Plans/Service-Territory-Map/APS\\_Service\\_Territory\\_Map\\_2017\\_FL.ashx?la=en&hash=45B0FCA1FDDAF5015C6A36CB693D8033](https://www.aps.com/-/media/APS/APSCOM-PDFs/Residential/Service-Plans/Service-Territory-Map/APS_Service_Territory_Map_2017_FL.ashx?la=en&hash=45B0FCA1FDDAF5015C6A36CB693D8033)

Scenario #6 assumes that 300MW annual solar project construction in the APS service territory is also attained in year 3. An additional 300MW of solar projects are then repeated on an annual basis in years 4 through 10. By year 11, 2,520MW of community solar is assumed to be in operation in the APS service territory.

This section provides separate total estimates of the statewide economic and fiscal impacts of each scenario, based on the assumption that construction takes place in years 1 through 7 (Scenario numbers #1, #3 and #5), or in years 1 through 10 (Scenario numbers #2, #4 and #6), but the operation of each installed solar project continues for 25 years from the date of commercial operation.

### **Lifetime Economic and Fiscal Impacts of Scenario #1: 100MW Community Solar over 7 Years**

Scenario #1 assumes that one 5MW solar project is constructed in year 1, followed by the construction of five 5MW and one 10MW solar projects in year 2. During years 3-7, 100MW solar project construction is assumed to annually take place in the APS service territory consisting of eight 5MW, two 10MW, and two 20MW solar projects per year. In year 8, Scenario #1 assumes that 540MW of community solar is in operation in the APS service territory. Each of the 67 installed solar projects are assumed to operate for 25 years.

The total cumulative economic and fiscal impacts for Scenario #1, encompassing the construction and 25 years operations for each installed project, is shown in Table 18.

**Table 18: The Lifetime Economic and Fiscal Impacts of Scenario #1** <sup>16</sup>

PHASE	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)
Total Construction Phase Impacts (7 years)	\$517,501,472	5,177.8	\$403,944,075
Total Operations Phase Impacts (31 years)	\$710,588,756	7,889.7	\$478,573,700
<b>Total Construction and Operations Phases Impacts (32 years)</b>	<b>\$1,228,090,227</b>	<b>13,067.5</b>	<b>\$882,517,775</b>

*Source: Authors' Calculations*

Seidman estimates that the total lifetime economic and fiscal impacts of Scenario #1 in the State of Arizona are more than \$1.2 billion State GDP, 13,067.5 job years employment, and more than \$882.5 million labor income. These are cumulative totals for a 32-year time horizon. They equate to average annual statewide contributions of \$38.4 million State GDP, 408.4 jobs, and \$27.6 million labor income.

### **Lifetime Economic and Fiscal Impacts of Scenario #2: 100MW Community Solar over 10 Years**

Scenario #2 assumes that one 5MW solar project is constructed in year 1, followed by the construction of five 5MW and one 10MW solar projects in year 2. During years 3-10, 100MW solar project construction is assumed to annually

<sup>16</sup> Columns may not tally exactly due to rounding.

take place in the APS service territory consisting of eight 5MW, two 10MW, and two 20MW solar projects per year. In year 11, Scenario #2 assumes that 840MW of community solar is in operation in the APS service territory. Each of the 103 installed solar projects are assumed to operate for 25 years.

The total cumulative economic and fiscal impacts for Scenario #2, encompassing the construction and 25 years operations for each installed project, is shown in Table 19.

**Table 19: The Lifetime Economic and Fiscal Impacts of Scenario #2**

PHASE	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)
Total Construction Phase Impacts (10 years)	\$803,656,560	8,050.1	\$627,249,675
Total Operations Phase Impacts (34 years)	\$1,037,175,383	11,526.6	\$699,745,740
<b>Total Construction and Operations Phases Impacts (35 years)</b>	<b>\$1,840,831,943</b>	<b>19,576.7</b>	<b>\$1,326,995,415</b>

*Source: Authors' Calculations*

Seidman estimates that the total lifetime economic and fiscal impacts of Scenario #2 in the State of Arizona are more than \$1.8 billion State GDP, 19,576.7 job years employment, and more than \$1.3 billion labor income. These are cumulative totals for a 35-year time horizon. They equate to average annual statewide contributions of \$52.6 million State GDP, 559.3 jobs, and \$37.9 million labor income.

### **Lifetime Economic and Fiscal Impacts of Scenario #3: 200MW Community Solar over 7 Years**

Scenario #3 assumes two 5MW solar projects are constructed in year 1, followed by the construction of five 5MW, two 10MW, and one 20MW solar projects in year 2. During years 3-7, 200MW solar project construction is assumed to annually take place in the APS service territory consisting of sixteen 5MW, four 10MW, and four 20MW solar projects per year. In year 8, Scenario #3 assumes that 1,075MW of community solar is in operation in the APS service territory. Each of the 130 installed solar projects are assumed to operate for 25 years.

The total cumulative economic and fiscal impacts for Scenario #3, encompassing the construction and 25 years operations for each installed project, is shown in Table 20.

**Table 20: The Lifetime Economic and Fiscal Impacts of Scenario #3**

PHASE	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)
Total Construction Phase Impacts (7 years)	\$1,026,599,386	10,296.4	\$801,174,954
Total Operations Phase Impacts (31 years)	\$1,410,025,321	15,648.9	\$948,901,865
<b>Total Construction and Operations Phases Impacts (32 years)</b>	<b>\$2,436,624,707</b>	<b>25,945.3</b>	<b>\$1,750,076,819</b>

*Source: Authors' Calculations*

Seidman estimates that the total lifetime economic and fiscal impacts of Scenario #3 in the State of Arizona are more than \$2.4 billion State GDP, 25,945.3 job years employment, and approximately \$1.8 billion labor income. These are cumulative totals for a 32-year time horizon. They equate to average annual statewide contributions of \$76.1 million State GDP, 810.8 jobs, and \$54.7 million labor income.

#### Lifetime Economic and Fiscal Impacts of Scenario #4: 200MW Community Solar over 10 Years

Scenario #4 assumes two 5MW solar projects are constructed in year 1, followed by the construction of five 5MW, two 10MW, and one 20MW solar projects in year 2. During years 3-10, 200MW solar project construction is assumed to annually take place in the APS service territory consisting of sixteen 5MW, four 10MW, and four 20MW solar projects per year. In year 11, Scenario #4 assumes that 1,675MW of community solar is in operation in the APS service territory. Each of the 202 installed solar projects are assumed to operate for 25 years.

The total cumulative economic and fiscal impacts for Scenario #4, encompassing the construction and 25 years operations for each installed project, is shown in Table 21.

**Table 21: The Lifetime Economic and Fiscal Impacts of Scenario #4** <sup>17</sup>

PHASE	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)
Total Construction Phase Impacts (10 years)	\$1,598,909,562	16,041.0	\$1,247,786,155
Total Operations Phase Impacts (34 years)	\$2,063,198,576	22,922.7	\$1,391,245,945
<b>Total Construction and Operations Phases Impacts (35 years)</b>	<b>\$3,662,108,138</b>	<b>38,963.7</b>	<b>\$2,639,032,099</b>

*Source: Authors' Calculations*

Seidman estimates that the total lifetime economic and fiscal impacts of Scenario #4 in the State of Arizona are approximately \$3.7 billion State GDP, 38,963.7 job years employment, and more than \$2.6 billion labor income. These are cumulative totals for a 35-year time horizon. They equate to average annual statewide contributions of \$104.6 million State GDP, 1,113.2 jobs, and \$75.4 million labor income.

#### Lifetime Economic and Fiscal Impacts of Scenario #5: 300MW Community Solar over 7 Years

Scenario #5 assumes four 5MW solar projects are constructed in year 1, followed by the construction of ten 5MW, three 10MW, and one 20MW solar projects in year 2. During years 3-7, 300MW solar project construction is assumed to annually take place in the APS service territory consisting of twenty-four 5MW, six 10MW, and six 20MW solar projects per year. In year 8, Scenario #5 assumes that 1,620MW of community solar is in operation in the APS service territory. Each of the 198 installed solar projects are assumed to operate for 25 years.

<sup>17</sup> Columns may not tally exactly due to rounding.

The total cumulative economic and fiscal impacts for Scenario #5, encompassing the construction and 25 years operations for each installed project, is shown in Table 22.

**Table 22: The Lifetime Economic and Fiscal Impacts of Scenario #5 <sup>18</sup>**

PHASE	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)
Total Construction Phase Impacts (7 years)	\$1,549,274,107	15,523.3	\$1,209,173,269
Total Operations Phase Impacts (31 years)	\$2,127,684,929	23,617.8	\$1,432,316,462
<b>Total Construction and Operations Phases Impacts (32 years)</b>	<b>\$3,676,959,036</b>	<b>39,141.1</b>	<b>\$2,641,489,732</b>

*Source: Authors' Calculations*

Seidman estimates that the total lifetime economic and fiscal impacts of Scenario #5 in the State of Arizona are approximately \$3.7 billion State GDP, 39,141.1 job years employment, and more than \$2.6 billion labor income. These are cumulative totals for a 32-year time horizon. They equate to average annual statewide contributions of \$114.9 million State GDP, 1,223.2 jobs, and \$82.5 million labor income.

#### **Lifetime Economic and Fiscal Impacts of Scenario #6: 300MW Community Solar over 10 Years**

Scenario #6 assumes four 5MW solar projects are constructed in year 1, followed by the construction of ten 5MW, three 10MW, and one 20MW solar projects in year 2. During years 3-10, 300MW solar project construction is assumed to annually take place in the APS service territory consisting of twenty four 5MW, six 10MW, and six 20MW solar projects per year. In year 11, Scenario #6 assumes that 2,520MW of community solar is in operation in the APS service territory. Each of the 306 installed solar projects are assumed to operate for 25 years.

The total cumulative economic and fiscal impacts for Scenario #6, encompassing the construction and 25 years operations for each installed project, is shown in Table 23.

**Table 23: The Lifetime Economic and Fiscal Impacts of Scenario #6**

PHASE	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)
Total Construction Phase Impacts (10 years)	\$2,407,739,370	24,140.2	\$1,879,090,071
Total Operations Phase Impacts (34 years)	\$3,107,444,812	34,528.5	\$2,095,832,582
<b>Total Construction and Operations Phases Impacts (35 years)</b>	<b>\$5,515,184,182</b>	<b>58,668.7</b>	<b>\$3,974,922,653</b>

*Source: Authors' Calculations*

Seidman estimates that the total lifetime economic and fiscal impacts of Scenario #6 in the State of Arizona are more than \$5.5 billion State GDP, 58,668.7 job years employment, and approximately \$4.0 billion labor income. These are

<sup>18</sup> Columns may not tally exactly due to rounding.

cumulative totals for a 35-year time horizon. They equate to average annual statewide contributions of \$157.6 million State GDP, 1,676.2 jobs, and \$113.6 million labor income.

## 4. LIFETIME IMPACTS OF SIX COMMUNITY SOLAR SCENARIOS IN THE TEP SERVICE TERRITORY

Tucson Electric Power (TEP) delivers power to more than 438,000 customers in the Tucson metropolitan area.<sup>19</sup> A map of their current service area is shown in Figure 2.

CCSA has provided six scenarios (Scenarios #7-12) to investigate the statewide implications of rolling out 30MW, 60MW and 90MW per year community solar program in the TEP service territory over a 7- or a 10-year time horizon, based on the mix of 5MW, 10MW and 20MW solar projects previously described in Section 2 (see Tables 6-8). The number of solar projects constructed annually in each scenario is based on the experience of CCSA members across multiple markets, with some adjustments made to reflect the expertise of solar contractors in Arizona and the nature of the state's distribution grid and interconnection queue. Each installed solar project included as part of a scenario is assumed to operate for 25 years.

Scenario #7 assumes that 30MW annual solar project construction in the TEP service territory is attained in year 3. An additional 30MW of solar projects are then repeated on an annual basis in years 4 through 7. By year 8, 165MW of community solar is assumed to be in operation in the TEP service territory.

Scenario #8 assumes that 30MW annual solar project construction in the TEP service territory is also attained in year 3. An additional 30MW of solar projects are then repeated on an annual basis in years 4 through 10. By year 11, 255MW of community solar is assumed to be in operation in the TEP service territory.

Scenario #9 assumes that 60MW annual solar project construction in the TEP service territory is attained in year 3. An additional 60MW of solar projects are then repeated on an annual basis in years 4 through 7. By year 8, 335MW of community solar is assumed to be in operation in the TEP service territory.

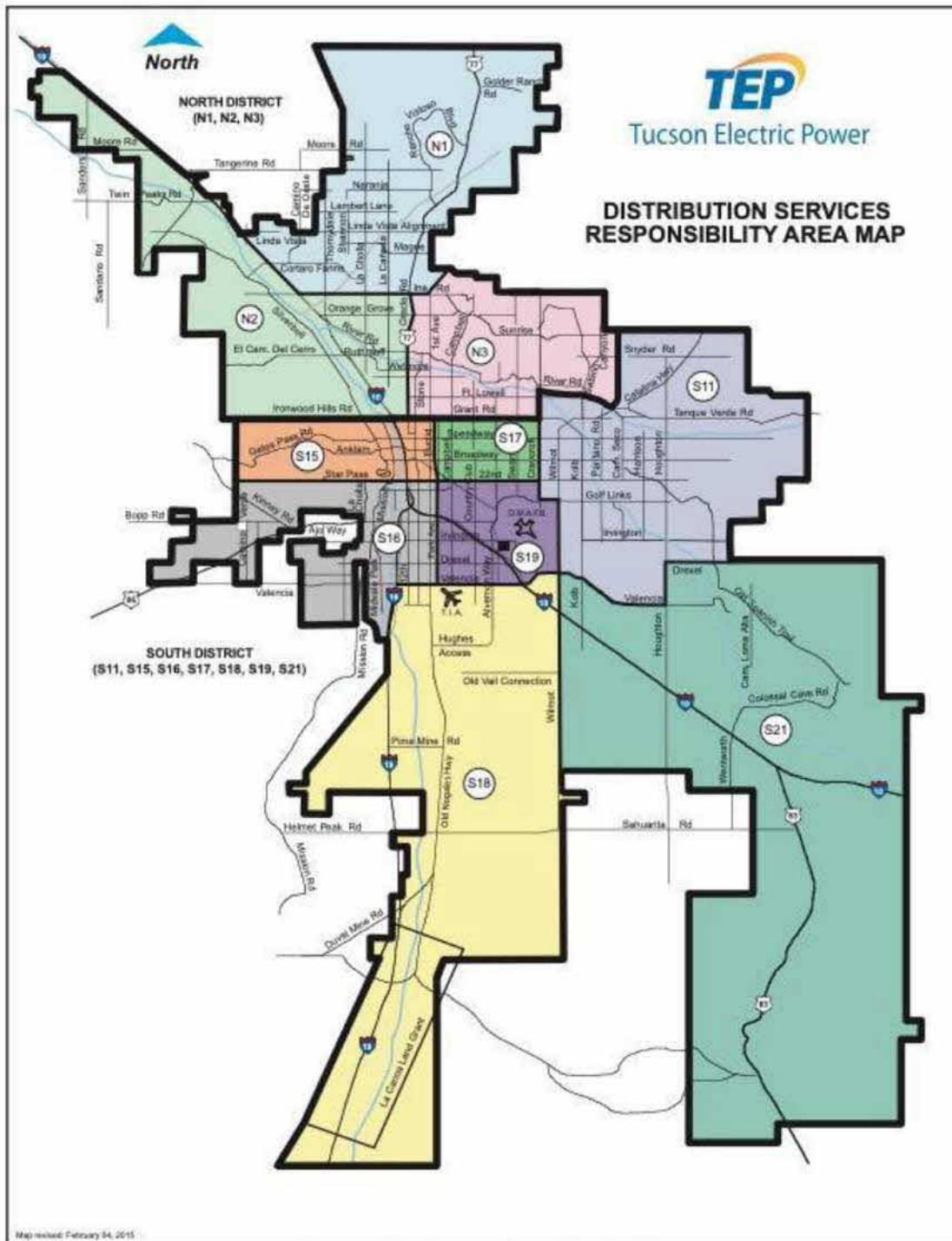
Scenario #10 assumes that 60MW annual solar project construction in the TEP service territory is also attained in year 3. An additional 60MW of solar projects are then repeated on an annual basis in years 4 through 10. By year 11, 515MW of community solar is assumed to be in operation in the TEP service territory.

Scenario #11 assumes that 90MW annual solar project construction in the TEP service territory is attained in year 3. An additional 90MW of solar projects are then repeated on an annual basis in years 4 through 7. By year 8, 515MW of community solar is assumed to be in operation in the TEP service territory.

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<sup>19</sup> Source: Tucson Electric Power, (2022). About. *tep.com*. Available at: <https://www.tep.com/about/>

Figure 2: TEP's Current Service Territory



Source: TEP<sup>20</sup>

<sup>20</sup> TEP, (2022). [www.tep.com](https://docs.tep.com/doc/tep-area-map.pdf). Available at: <https://docs.tep.com/doc/tep-area-map.pdf>

Scenario #12 assumes that 90MW annual solar project construction in the TEP service territory is also attained in year 3. An additional 90MW of solar projects are then repeated on an annual basis in years 4 through 10. By year 11, 785MW of community solar is assumed to be in operation in the TEP service territory.

This section provides separate total estimates of the statewide economic and fiscal impacts of each scenario, based on the assumption that construction takes place in years 1 through 7 (Scenario numbers #7, #9 and #11), or in years 1 through 10 (Scenario numbers #8, #10 and #12), but the operation of each installed solar project continues for 25 years. Please note: all installations take place in Pima County, but the economic impact estimates are statewide.

#### **Lifetime Economic and Fiscal Impacts of Scenario #7: 30MW Community Solar over 7 Years**

Scenario #7 assumes that one 5MW solar project is constructed in year 1, and two 5MW solar projects in year 2. During years 3-7, 30MW solar project construction is assumed to annually take place in the TEP service territory consisting of four 5MW and one 10MW solar projects per year. In year 8, Scenario #7 assumes that 165MW of community solar is in operation in the TEP service territory. Each of the 28 installed solar projects are assumed to operate for 25 years. CCSA did not consider 20MW installations in this scenario due to the small overall program size.

The total cumulative economic and fiscal impacts for Scenario #7, encompassing the construction and 25 years operations for each installed project, is shown in Table 24.

**Table 24: The Lifetime Economic and Fiscal Impacts of Scenario #7**

PHASE	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)
Total Construction Phase Impacts (7 years)	\$166,668,886	1,609.7	\$130,460,687
Total Operations Phase Impacts (31 years)	\$227,769,980	2,544.7	\$155,114,687
<b>Total Construction and Operations Phases Impacts (32 years)</b>	<b>\$394,438,866</b>	<b>4,154.4</b>	<b>\$285,575,374</b>

*Source: Authors' Calculations*

Seidman estimates that the total lifetime economic and fiscal impacts of Scenario #7 in the State of Arizona are more than \$394.4 million State GDP, 4,154.4 job years employment, and approximately \$285.6 million labor income. These are cumulative totals for a 32-year time horizon. They equate to average annual statewide contributions of \$12.3 million State GDP, 129.8 jobs, and \$8.9 million labor income.

#### **Lifetime Economic and Fiscal Impacts of Scenario #8: 30MW Community Solar over 10 Years**

Scenario #8 assumes that one 5MW solar project is constructed in year 1, and two 5MW solar projects in year 2. During years 3-10, 30MW solar project construction is assumed to annually take place in the TEP service territory

consisting of four 5MW and one 10MW solar projects per year. In year 11, Scenario #8 assumes that 255MW of community solar is in operation in the TEP service territory. Each of the 43 installed solar projects are assumed to operate for 25 years. CCSA did not consider 20MW installations in this scenario due to the small overall program size.

The total cumulative economic and fiscal impacts for Scenario #8, encompassing the construction and 25 years operations for each installed project, is shown in Table 25.

**Table 25: The Lifetime Economic and Fiscal Impacts of Scenario #8**

PHASE	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)
Total Construction Phase Impacts (10 years)	\$257,358,369	2,487.2	\$201,439,466
Total Operations Phase Impacts (34 years)	\$343,126,034	3,834.8	\$233,833,850
<b>Total Construction and Operations Phases Impacts (35 years)</b>	<b>\$600,484,403</b>	<b>6,322.0</b>	<b>\$435,273,316</b>

*Source: Authors' Calculations*

Seidman estimates that the total lifetime economic and fiscal impacts of Scenario #8 in the State of Arizona are approximately \$600.5 million State GDP, 6,322.0 job years employment, and approximately \$435.3 million labor income. These are cumulative totals for a 35-year time horizon. They equate to average annual statewide contributions of \$17.2 million State GDP, 180.6 jobs, and \$12.4 million labor income.

#### **Lifetime Economic and Fiscal Impacts of Scenario 9: 60MW Community Solar over 7 Years**

Scenario #9 assumes two 5MW solar projects are constructed in year 1, followed by the construction of three 5MW and one 10MW solar projects in year 2. During years 3-7, 60MW solar project construction is assumed to annually take place in the TEP service territory consisting of four 5MW, two 10MW, and one 20MW solar projects per year. In year 8, Scenario #9 assumes that 335MW of community solar is in operation in the TEP service territory. Each of the 41 installed solar projects are assumed to operate for 25 years.

The total cumulative economic and fiscal impacts for Scenario #9, encompassing the construction and 25 years operations for each installed project, is shown in Table 26.

**Table 26: The Lifetime Economic and Fiscal Impacts of Scenario #9**

PHASE	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)
Total Construction Phase Impacts (7 years)	\$321,549,811	3,216.3	\$251,014,986
Total Operations Phase Impacts (31 years)	\$441,090,493	4,898.4	\$297,120,098
<b>Total Construction and Operations Phases Impacts (32 years)</b>	<b>\$762,640,304</b>	<b>8,114.7</b>	<b>\$548,135,084</b>

*Source: Authors' Calculations*

Seidman estimates that the total lifetime economic and fiscal impacts of Scenario #9 in the State of Arizona are more than \$762.6 million State GDP, 8,114.7 job years employment, and more than \$548.1 million labor income. These are cumulative totals for a 32-year time horizon. They equate to average annual statewide contributions of \$23.8 million State GDP, 253.6 jobs, and \$17.1 million labor income.

#### **Lifetime Economic and Fiscal Impacts of Scenario 10: 60MW Community Solar over 10 Years**

Scenario #10 assumes two 5MW solar projects are constructed in year 1, followed by the construction of three 5MW and one 10MW solar projects in year 2. During years 3-10, 60MW solar project construction is assumed to annually take place in the TEP service territory consisting of four 5MW, two 10MW, and one 20MW solar projects per year. In year 11, Scenario #10 assumes that 515MW of community solar is in operation in the TEP service territory. Each of the 62 installed solar projects are assumed to operate for 25 years.

The total cumulative economic and fiscal impacts for Scenario #10, encompassing the construction and 25 years operations for each installed project, is shown in Table 27.

**Table 27: The Lifetime Economic and Fiscal Impacts of Scenario #10**

PHASE	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)
Total Construction Phase Impacts (10 years)	\$493,237,852	4,941.1	\$384,995,677
Total Operations Phase Impacts (34 years)	\$634,889,630	7,056.5	\$428,334,513
<b>Total Construction and Operations Phases Impacts (35 years)</b>	<b>\$1,128,127,482</b>	<b>11,997.6</b>	<b>\$813,330,190</b>

*Source: Authors' Calculations*

Seidman estimates that the total lifetime economic and fiscal impacts of Scenario #10 in the State of Arizona are more than \$1.1 billion State GDP, 11,997.6 job years employment, and more than \$813.3 million labor income. These are cumulative totals for a 35-year time horizon. They equate to average annual statewide contributions of \$32.2 million State GDP, 342.8 jobs, and \$23.2 million labor income.

#### **Lifetime Economic and Fiscal Impacts of Scenario 11: 90MW Community Solar over 7 Years**

Scenario #11 assumes three 5MW solar projects are constructed in year 1, followed by the construction of six 5MW and two 10MW solar projects in year 2. In year 3, ten 5MW, two 10MW and one 20MW solar projects are constructed. During years 4-7, 90MW solar project construction is assumed to annually take place in the TEP service territory consisting of six 5MW, two 10MW, and two 20MW solar projects per year. In year 8, Scenario #11 assumes that 515MW of community solar is in operation in the TEP service territory. Each of the 64 installed solar projects are assumed to operate for 25 years.

The total cumulative economic and fiscal impacts for Scenario #11, encompassing the construction and 25 years operations for each installed project, is shown in Table 28.

**Table 28: The Lifetime Economic and Fiscal Impacts of Scenario #11** <sup>21</sup>

PHASE	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)
Total Construction Phase Impacts (7 years)	\$494,055,871	4,940.6	\$385,665,976
Total Operations Phase Impacts (31 years)	\$678,202,201	7,531.0	\$456,846,866
<b>Total Construction and Operations Phases Impacts (32 years)</b>	<b>\$1,172,258,071</b>	<b>12,471.6</b>	<b>\$842,512,842</b>

Source: Authors' Calculations

Seidman estimates that the total lifetime economic and fiscal impacts of Scenario #11 in the State of Arizona are approximately \$1.2 billion State GDP, 12,471.6 job years employment, and more than \$842.5 million labor income. These are cumulative totals for a 32-year time horizon. They equate to average annual statewide contributions of \$36.6 million State GDP, 389.7 jobs, and \$26.3 million labor income.

#### Lifetime Economic and Fiscal Impacts of Scenario 12: 90MW Community Solar over 10 Years

Scenario #12 assumes three 5MW solar projects are constructed in year 1, followed by the construction of six 5MW and two 10MW solar projects in year 2. In year 3, ten 5MW, two 10MW and one 20MW solar projects are constructed. During years 4-10, 90MW solar project construction is assumed to annually take place in the TEP service territory consisting of six 5MW, two 10MW, and two 20MW solar projects per year. In year 11, Scenario #12 assumes that 785MW of community solar is in operation in the TEP service territory. Each of the 94 installed solar projects are assumed to operate for 25 years.

The total cumulative economic and fiscal impacts for Scenario #12, encompassing the construction and 25 years operations for each installed project, is shown in Table 29.

**Table 29: The Lifetime Economic and Fiscal Impacts of Scenario #12** <sup>22</sup>

PHASE	STATE GDP (\$)	EMPLOYMENT (Job Years)	LABOR INCOME (\$)
Total Construction Phase Impacts (10 years)	\$749,171,465	7,518.5	\$584,646,133
Total Operations Phase Impacts (34 years)	\$963,048,962	10,700.2	\$649,418,244
<b>Total Construction and Operations Phases Impacts (35 years)</b>	<b>\$1,712,220,427</b>	<b>18,218.6</b>	<b>\$1,234,064,377</b>

Source: Authors' Calculations

<sup>21</sup> Columns may not tally exactly due to rounding.

<sup>22</sup> Columns may not tally exactly due to rounding.

Seidman estimates that the total lifetime economic and fiscal impacts of Scenario #12 in the State of Arizona are more than \$1.7 billion State GDP, 18,218.6 job years employment, and more than \$1.2 billion labor income. These are cumulative totals for a 35-year time horizon. They equate to average annual statewide contributions of \$48.9 million State GDP, 520.5 jobs, and \$35.3 million labor income.



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## THE POTENTIAL ECONOMIC & FISCAL IMPACTS OF COMMUNITY SOLAR PROJECTS IN THE STATE OF ARIZONA

Community solar refers to small- to mid-scale solar arrays located within a community where multiple customers can subscribe and receive credits on their utility bills for their share of the power produced, just as if the panels were on their own roofs. To date, 21 states nationwide and the District of Columbia have proposed, established, or have regulations pending for community solar projects.

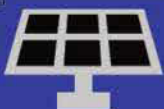
As the sunniest state in the United States, Arizona is uniquely positioned to add momentum to the community solar sector and reap the environmental and economic benefits.

In May 2022, the Arizona Corporation Commission formed a working group to study community solar. In fall 2022, the Coalition for Community Solar Access (CCSA) commissioned the Seidman Research Institute at Arizona State University to produce statewide economic and fiscal impact estimates for the construction and operation of three solar project sizes (5MW, 10MW and 20MW), and 12 community solar rollout scenarios in the state. Six of CCSA's scenarios are located in the APS service territory. Six are located in Tucson Electric Power's (TEP) service territory.

Seidman's analysis assumes that all projects are ground mount single axis tracking projects to both simplify the data set and align with the majority of community solar development across the country. The range of impacts will be different for other types of solar project.

The number of solar projects constructed annually in each scenario is based on the experience of CCSA members across multiple markets, with some adjustments made to reflect the expertise of solar contractors in Arizona and the nature of the state's distribution grid and interconnection queue.

The economic impacts are estimated using an IMPLAN model customized for the State of Arizona. All dollar impacts are estimated in current (2022) dollars. The base impacts for each solar project size are summarized below:



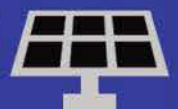
### 5MW SOLAR PROJECT (6 months Construction, 25 years Operations)

\$12.2 million total contribution to State GDP  
128.3 job years total employment  
\$8.9 million total labor income



### 10MW SOLAR PROJECT (7.5 months Construction, 25 years Operations)

\$22.6 million total contribution to State GDP  
240.8 job years total employment  
\$16.2 million total labor income



### 20MW SOLAR PROJECT (9 months Construction, 25 years Operations)

\$41.7 million total contribution to State GDP  
451.8 job years total employment  
\$29.5 million total labor income

# ECONOMIC & FISCAL IMPACTS OF COMMUNITY SOLAR PROJECTS IN THE APS SERVICE TERRITORY

Arizona Public Service (APS) serves more than 1.3 million homes and businesses in 11 of Arizona's 15 counties. Their service territory stretches from the border town of Douglas in the south to the Grand Canyon in the north, Gila Bend in the west, and Payson in the east.

What are the statewide implications of rolling out up to 100MW, 200MW and 300MW community solar programs per year over a 7- or a 10-year time horizon in the APS service territory, using combinations of 5MW, 10MW and 20MW solar projects suggested by the CCSA?

The **total** impacts for the 7-year rollout scenarios (opposite) include the construction and operations phases for each scenario. They represent cumulative totals for a 32-year time horizon and range from:

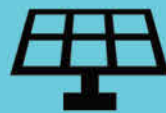
- \$1.2 to \$3.7 billion contribution to State GDP.
- 13,068 to 39,141 job years of employment.
- \$882.5 million to \$2.6 billion total labor income.

State GDP represents the dollar value of all goods and services produced for final demand in Arizona. The employment estimate is a count of full- and part-time jobs, including wage/salary workers, and the self-employed. Measured in job years, it is not a synonym for a job. For example, a person working at a solar contractor for five consecutive years has one job but five job years of employment. The labor income impact estimate includes all forms of employment income.

The **average annual** estimated impacts for the 7-year community solar rollout scenarios range from:

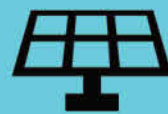
- \$38.4 to \$114.9 million contribution to State GDP.
- 408 to 1,223 job years employment.
- \$27.6 to \$82.5 million labor income.

## APS: 7-YEAR ROLLOUT PLUS 25 YEARS OF OPERATIONS



**100MW SOLAR PROJECT**  
*\$1.2 billion total State GDP*  
*13,067.5 job years total employment*  
*\$882.5 million total labor income*

**200MW SOLAR PROJECT**  
*\$2.4 billion total State GDP*  
*25,945.3 job years total employment*  
*\$1.8 billion total labor income*



**300MW SOLAR PROJECT**  
*\$3.7 billion total State GDP*  
*39,141.1 job years total employment*  
*\$2.6 billion total labor income*

## APS: 10-YEAR ROLLOUT PLUS 25 YEARS OF OPERATIONS



**100MW SOLAR PROJECT**  
*\$1.8 billion total State GDP*  
*19,576.7 job years total employment*  
*\$1.3 billion total labor income*

**200MW SOLAR PROJECT**  
*\$3.7 billion total State GDP*  
*38,963.7 job years total employment*  
*\$2.6 billion total labor income*



**100MW SOLAR PROJECT**  
*\$5.5 billion total State GDP*  
*58,668.7 job years total employment*  
*\$4.0 billion total labor income*

The **total** impacts for the 10-year rollout scenarios (again shown opposite) include the construction and operations phases for each scenario. They represent cumulative totals for a 35-year time horizon and range from:

- \$1.8 to \$5.5 billion contribution to State GDP.
- 19,577 to 58,669 job years of employment.
- \$1.3 billion to \$4.0 billion total labor income.

The **average annual** impacts for the 10-year community solar rollout scenarios range from:

- \$52.6 to \$157.6 million contribution to State GDP.
- 559 to 1,676 job years of employment.
- \$37.9 to \$113.6 million labor income.

# ECONOMIC & FISCAL IMPACTS OF COMMUNITY SOLAR PROJECTS IN THE TEP SERVICE TERRITORY

Tucson Electric Power (TEP) delivers power to more than 438,000 customers in the Tucson metropolitan area.

What are the statewide implications of rolling out up to 30MW, 60MW and 90MW community solar programs per year over a 7- or a 10-year time horizon in the TEP service territory, using combinations of 5MW, 10MW and 20MW solar projects suggested by the CCSA?

The **total** impacts for the 7-year rollout scenarios (opposite) include the construction and operations phases for each scenario. They represent cumulative totals for a 32-year time horizon and range from:

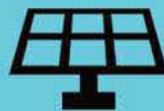
- \$394.4 million to \$1.2 billion contribution to State GDP.
- 4154.4 to 12,471.6 job years of employment.
- \$285.6 to \$842.5 million total labor income.

State GDP again represents the dollar value of all goods and services produced for final demand in Arizona. The employment estimate is a count of full- and part-time jobs, including wage/salary workers, and the self-employed, measured in terms of job years (that is, a job held for 12 months). The labor income impact estimate includes all forms of employment income.

The **average annual** estimated impacts for the 7-year community solar rollout scenarios range from:

- \$12.3 to \$36.6 million contribution to State GDP.
- 130 to 390 job years employment.
- \$8.9 to \$26.3 million labor income.

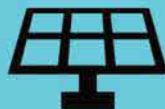
## TEP: 7-YEAR ROLLOUT PLUS 25 YEARS OF OPERATIONS



**30MW SOLAR PROJECT**  
*\$394.4 million total State GDP*  
*4,154.4 job years total employment*  
*\$285.6 million total labor income*

### 60MW SOLAR PROJECT

*\$762.6 million total State GDP*  
*8,114.7 job years total employment*  
*\$548.1 million total labor income*



**90MW SOLAR PROJECT**  
*\$1.2 billion total State GDP*  
*12,471.6 job years total employment*  
*\$842.5 million total labor income*

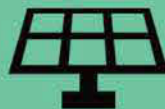
## TEP: 10-YEAR ROLLOUT PLUS 25 YEARS OF OPERATIONS



**30MW SOLAR PROJECT**  
*\$600.5 million total State GDP*  
*6,332.0 job years total employment*  
*\$435.3 million total labor income*

### 60MW SOLAR PROJECT

*\$1.1 billion total State GDP*  
*11,997.6 job years total employment*  
*\$813.3 million total labor income*



**90MW SOLAR PROJECT**  
*\$1.7 billion total State GDP*  
*18,218.6 job years total employment*  
*\$1.2 billion total labor income*

The **total** impacts for the 10-year rollout scenarios (again shown opposite) include the construction and operations phases for each scenario. They represent cumulative totals for a 35-year time horizon and range from:

- \$600.5 million to \$1.7 billion contribution to State GDP.
- 6,332 to 18,219 job years of employment.
- \$435.3 million to \$1.2 billion total labor income.

The **average annual** impacts for the 10-year community solar rollout scenarios range from:

- \$17.2 to \$48.9 million contribution to State GDP.
- 181 to 521 job years of employment.
- \$12.4 to \$35.3 million labor income.

# ECONOMIC & FISCAL IMPACTS OF COMMUNITY SOLAR PROJECTS FOR THE STATE OF ARIZONA

What are the potential statewide implications if community solar projects are concurrently established in both the APS and TEP service territories?

In projecting a low-range 7-year rollout of up to 100MW projects per year in APS' service territory, and 30MW projects per year in TEP's service territory, Seidman estimates that community solar could contribute in total over 32 years:



**\$1.6 BILLION  
TOTAL  
STATE  
GDP**



**17,222  
TOTAL  
JOB YEARS  
EMPLOYMENT**



**\$1.2 BILLION  
TOTAL  
WAGES &  
SALARIES**

The estimates above assume a combination of 95 ground mount single axis tracking solar arrays of various generating capacity installed over 7 years, generating 705MW of capacity, and 25 years of operation.

In projecting an upper-range 10-year rollout of up to 300MW projects per year in APS' service territory, and 90MW projects per year in TEP's service territory, Seidman estimates that community solar could contribute in total over 35 years:



**\$7.2 BILLION  
TOTAL  
STATE  
GDP**



**76,887  
TOTAL  
JOB YEARS  
EMPLOYMENT**



**\$5.2 BILLION  
TOTAL  
WAGES &  
SALARIES**

The estimates above assume a combination of 400 ground mount single axis tracking solar arrays of various generating capacity installed over 10 years, generating 3.31 Gigawatts of capacity, and 25 years of operation.



This study was conducted by the L. William Seidman Research Institute - the consultancy arm of W. P. Carey School of Business, Arizona State University. First established in 1985 to serve as an applied business research and consultancy resource for the southwest business community, Seidman currently offers a diverse range of business and economics consulting services to public and private sector clients throughout North America. For more information, visit: <https://seidmaninstitute.com/> or follow Seidman on Twitter - @SeidmanResearch.

The study was commissioned by the Coalition for Community Solar Access. CCSA is a national coalition of businesses and nonprofits working to expand customer choice and access to solar for all American households and businesses through community solar. Our mission is to empower every American energy consumer with the option to choose local, clean and affordable community solar. We work with customers, utilities, local stakeholders and policymakers to develop and implement policies and best practices that ensure community solar programs provide a win, win, win for all, starting with the customer. For more information, visit <https://www.communitysolar-access.org> and follow the group on Facebook, Twitter, and LinkedIn.

